

REMARKS

Summary of Substance of Interview

Applicant thanks the Examiner for the courteous and productive telephonic interview conducted on June 12, 2008. During the interview, the Examiner's interpretation of a bidirectional bus as being analogous to full duplex communication, i.e., capable of transferring data in both directions on the bus at the same time, as set forth in the Response to Arguments section of the Office Action dated February 15, 2008, was discussed.

Applicant's representative explained that to one of ordinary skill in the art, a bidirectional bus refers to the capability of the same bus lines to carry data in either direction at different times, rather than at the same time. Subsequent to the discussion, the Examiner stated his agreement that a bidirectional bus is not required to transfer data into directions at the same time, but rather is capable of transferring data in either direction at different times.

No agreement with regard to allowability of the claims was reached.

Objections to the Claims

Claim 1 has been objected to because the limitation "a unidirectional bus capable of ***sending and receiving*** a signal unidirectionally" is allegedly inconsistent with the language of claims 2 and 5. Applicant has amended claim 1 to recite "a directional bus ***which either sends or receives*** a signal unidirectionally," as suggested by the Examiner.

Applicant respectfully requests that this objection be withdrawn.

Claim Rejections

Claim 1 -- 35 U.S.C. § 103(a)

Claim 1 has been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the so-called Applicant's Admitted Prior Art ("AAPA") in view of U.S. Pat. Pub. No. 2002/0069317 to Chow *et al.* ("Chow") and U.S. Patent No. 5,859,545 to Thörnblad ("Thörnblad"). Applicant traverses this rejection.

The combination of the so-called AAPA, Chow and Thörnblad does not disclose or suggest at least a control device which, when an arbitrary memory module is being replaced, switches an operational mode of a ring bus from a unidirectional bus which either sends or receives a signal unidirectionally, to a bi-directional bus which sends and receives a signal bi-directionally, as recited in the claim.

The Examiner concedes that the AAPA does not disclose or suggest a control device which, when an arbitrary memory module is being replaced, switches an operational mode of a ring bus from a unidirectional bus which either sends or receives a signal unidirectionally, to a bi-directional bus which sends and receives a signal bi-directionally.

The Examiner, however, notes that in the AAPA two unidirectional buses are provided and alleges that, when taken together, the two unidirectional buses form a bidirectional bus (see Office Action, page 3, paragraph 4). Further, in the Response to Arguments section of the Office Action, the Examiner analogizes a bidirectional bus to full-duplex communication as support for refuting Applicant's position than a bidirectional bus provides bidirectional communication on common lines. Specifically, the Examiner states, "If a bidirectional bus were simply a single bus as Applicant is alleging, then communication would only be able to flow in one direction at a

time (i.e. half-duplex communication) because signals flowing in opposite directions would collide and interfere with each other. However, on a true bidirectional bus communication is able to flow in both directions at the same time (i.e. full-duplex communication)....” Applicant respectfully submits that the Examiner’s analogy to full-duplex communication is inappropriate as regards a data bus in the context of a memory system, as recited in the claims.

As well known to one of ordinary skill in the art, a bidirectional bus in a memory system does not provide simultaneous dataflow in two directions, but rather refers to the capability of the same bus lines to carry data in either direction at different times. The direction of dataflow on the common lines is controlled by the circuitry which terminates the bus lines. For example, a bidirectional bus connecting a memory to a microprocessor allows the microprocessor to read data from the memory and write data to the memory using the same set of bus lines. However, the data is not simultaneously read and written. Further, the Examiner cites Thörnblad to allegedly disclose a bidirectional buffer which allows bidirectional dataflow on a bus line depending on the state of the bidirectional buffer. Therefore, the Examiner’s argument in the Response to Arguments section of the Office Action is inconsistent.

Thus, to one of ordinary skill in the art, a bidirectional bus is a single bus structure which provides bidirectional communication on common lines rather than two separate bus structures which each provide communication in only one direction, as alleged by the Examiner. Accordingly, the AAPA does not disclose or suggest a unidirectional bus capable of bidirectional operation, and therefore also does not disclose a control device as claimed for such a bus.

Chow does not cure the above-noted deficiencies of the AAPA. The Examiner relies on Chow to allegedly disclose a hard disk drive to which data stored in the memory modules is

copied a predetermined time periods. Even if Chow provides such disclosure, the reference fails to disclose or suggest the claimed features missing in the so-called AAPA.

Thörnblad, also cited in the rejection, merely discloses a bidirectional buffer, but also fails to disclose or suggest a control device which, when an arbitrary memory module is being replaced, switches an operational mode of a ring bus from a unidirectional bus capable of either sending or receiving a signal unidirectionally, to a bi-directional bus capable of sending and receiving a signal bi-directionally, as recited in the claim.

In view of the above, one of ordinary skill in the art at the time the invention was made would not have been motivated to combine the references as attempted by the Examiner since the references, alone or in combination, fail to disclose or suggest all of the claimed features.

Accordingly, claim 1 is patentable over the combination of the so-called AAPA, Chow and Thörnblad.

Claims 2, 15, 17 and 19 -- 35 U.S.C. § 103(a)

Claims 2, 15, 17 and 19 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Thörnblad and U.S. Pat. No. 5,586,291 to Lasker *et al.* (“Lasker”). Applicant traverses this rejection.

Addressing claim 2, the combination of the so-called AAPA, Thörnblad and Lasker does not disclose or suggest at least a control device which, when an arbitrary memory module is being replaced, switches an operational mode of a ring bus from a unidirectional bus which either sends or receives a signal unidirectionally, to a bi-directional bus which sends and receives a signal bi-directionally, as recited in the claim. As established in the arguments for claim 1

above, the combination of the AAPA and Thörnblad does not disclose or suggest at least these features. Lasker does not cure the deficiencies of the AAPA-Thörnblad combination.

Lasker is directed to a disk storage and cache memory system which allows faster data access by using volatile memory (Abstract) rather than disk storage for working data access. Neither the portions of Lasker cited by the Examiner, nor any other portion of Lasker, discloses or suggests the above-noted features missing in the combination of the AAPA and Thörnblad.

Applicant submits that even if Lasker does provide the disclosure list by the Examiner, Lasker does not disclose or suggest at least a control device which, when an arbitrary memory module is being replaced, switches an operational mode of a ring bus from a unidirectional bus which either sends or receives a signal unidirectionally, to a bi-directional bus which sends and receives a signal bi-directionally, as recited in claim 2.

In the Response to Arguments section of the Office Action, the Examiner alleges that Applicant merely provided general allegations without pointing out how the language of the claims patentably distinguishes them from the references. Applicant respectfully disagrees with the Examiner's characterization of the arguments.

As noted in the arguments presented in the previous Response, as well as the arguments set forth above, the combination of references cited by the Examiner fails to disclose or suggest all the elements of claim 2, as required for a rejection under 35 U.S.C § 103(a). Applicant relies upon the arguments for claim 1, which clearly explain the features not disclosed or suggested by the AAPA-Thörnblad combination which are also recited in claim 2. The Examiner does not allege that Lasker also discloses these features, but cites the reference as allegedly disclosing

additional claimed features recited by claim 2, i.e., a hard disk device to which the data stored in memory modules is copied at predetermined intervals.

Thus, the arguments set forth by Applicant are not merely a general allegation, but instead point out the claimed features deficient in the combination of references attempted by the Examiner.

Therefore, in view of the arguments above as well as the arguments for claim 1, Applicant submits that one of ordinary skill in the art at the time the invention was made would not have been motivated to combine the references since the AAPA, Thörnblad and Lasker, alone or in combination, do not disclose or suggest all the features of claim 2.

Accordingly, claim 2 is patentable over the combination of references attempted by the Examiner. Claims 15, 17 and 19, which depend from claim 2, are patentable at least by virtue of their dependence.

Claims 5, 8, 16, 18 and 20 -- 35 U.S.C. § 103(a)

Claims 5, 8, 16, 18 and 20 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Lasker, Thörnblad and U.S. Patent No. 6,411,539 to Funaba *et al.* ("Funaba"). Applicant traverses this rejection.

Addressing claim 5, the combination of the so-called AAPA, Thörnblad, Lasker and Funaba does not disclose or suggest at least a hard disk device to which the data stored in said memory modules is copied at predetermined time periods, as recited in the claim. The Examiner relies on Lasker for such disclosure (Office Action, page 12).

Lasker is directed to a disk controller having cache memory. Host-supplied write data is stored in allocated non-volatile memory blocks of the cache memory and then stored on the disk drive, after which the memory blocks are de-allocated (Abstract). Thus, the system of Lasker does not copy *data stored in said memory modules*, as recited in the claim, since the *data in the cache memory is transient* because the cache memory is allocated and de-allocated only as necessary to write to the disk.

Further, Lasker does not disclose or suggest that data stored in said memory modules is *copied at predetermined time periods*, as recited in the claim. The system of Lasker merely writes data from the cache memory to the disk *based on a host-initiated write request* (column 7, lines 16-18), but is silent as to copying data stored in the memory modules at predetermined time periods. Neither Funaba nor Thörnblad cure the above-noted deficiencies.

Funaba is directed to a memory system capable of controlling signal waveform disturbances due to signal reflection (column 3, lines 17-19). The Examiner relies on Funaba only to allegedly disclose a short-circuit device. Thörnblad is relied on only to allegedly disclose a bidirectional buffer. However, neither the portions of Funaba and Thörnblad cited by the Examiner, nor any other portions of Funaba and Thörnblad, disclose or suggest the above-noted features deficient in the AAPA-Lasker combination.

In the Response to Arguments section of the Office Action, the Examiner mischaracterizes Applicant's argument as attacking the references individually to show nonobviousness. Applicant respectfully submits that the arguments set forth above, as well as the arguments presented in the previous Response, identify claim elements missing in the

Examiner's attempted combination of references. In order to establish a *prima facie* case of obviousness, the combined references must disclose or suggest all the claimed elements. Thus, Applicant's arguments do not attack the references individually, but rather explain how the combined references fail to disclose or suggest all the features of the claim as required for a rejection under 35 U.S.C. § 103(a).

Since the combined references fail to disclose or suggest all the features claimed by Applicant, one of ordinary skill in the art at the time the invention was made would not have been motivated to combine the references as attempted by the Examiner. Accordingly, claim 5 is patentable over the attempted combination of the so-called AAPA, Thörnblad, Lasker and Funaba. Claims 8, 16, 18 and 20, which depend from claim 5, are patentable at least by virtue of their dependence.

Claims 3 and 6 --- 35 U.S.C. § 103(a)

Claims 3 and 6 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Chow and Thörnblad, and further in view of Funaba. Applicant traverses this rejection.

Claims 3 and 6 depend from claim 1 and therefore incorporate the above-noted limitations of claim 1 which, as established above, are not disclosed or suggested by the combination of the AAPA, Chow and Thörnblad. Funaba does not cure the deficiencies of the AAPA-Chow-Thörnblad combination.

Funaba is directed to a memory system capable of controlling signal waveform disturbances due to signal reflection (column 3, lines 17-19). The Examiner relies on Funaba

only to allegedly disclose a short-circuit device. However, neither the portions of Funaba cited by the Examiner, nor any other portions of Funaba, disclose or suggest the above-noted features deficient in the AAPA-Chow-Thörnblad combination.

Therefore, one of ordinary skill in the art at the time the invention was made would not have been motivated to combine the references as attempted by the Examiner since the references, alone or in combination, fail to disclose or suggest all the elements recited in claims.

Accordingly, claims 3 and 6 are patentable over the combination of references attempted by the Examiner.

Claims 4 and 7 --- 35 U.S.C. § 103(a)

Claims 4 and 7 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Lasker and Thörnblad, and further in view of Funaba. Applicant traverses this rejection.

Claims 4 and 7 depend from claim 2 and therefore incorporate the above-noted limitations of claim 2 which, as established above, are not disclosed or suggested by the combination of the AAPA, Lasker and Thörnblad. Funaba does not cure the deficiencies of the AAPA-Lasker-Thörnblad combination.

As noted above, the Examiner relies on Funaba only to allegedly disclose a short-circuit device. However, neither the portions of Funaba cited by the Examiner, nor any other portions of Funaba, disclose or suggest the above-noted features deficient in the AAPA-Lasker-Thörnblad combination.

Therefore, one of ordinary skill in the art at the time the invention was made would not have been motivated to combine the references as attempted by the Examiner since the references, alone or in combination, fail to disclose or suggest all the elements recited in claims.

Accordingly, claims 4 and 7 are patentable over the combination of references attempted by the Examiner.

Claim 9 --- 35 U.S.C. § 103(a)

Claim 9 has been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Chow, Thörnblad and Funaba, and further in view of U.S. Pat. No. 6,487,623 to Emerson *et al.* (“Emerson”). Applicant traverses this rejection.

The combination of the AAPA, Chow, Thörnblad, Funaba and Emerson does not disclose or suggest all the features recited in claim 9. As noted above in the arguments for claim 1 and claims 3 and 6, the combination of the AAPA, Chow, Thörnblad and Funaba does not disclose or suggest at least a control device which, when an arbitrary memory module is being replaced, switches an operational mode of a ring bus from a unidirectional bus which either sends or receives a signal unidirectionally, to a bi-directional bus which sends and receives a signal bi-directionally, as incorporated into claim nine by virtue of its dependence from claim 1. Emerson does not cure the deficiencies of the AAPA-Chow-Thörnblad-Funaba combination.

The Examiner relies on Emerson to allegedly disclose an FET switch as a short-circuit device for short-circuiting or opening bus connections which are disconnected by removing a memory module. Emerson, however, discloses FET isolation buffers 160 which provide

isolation of a RAM module 106 from a memory bus 105a for removal of the RAM module 106 (column 7, lines 12-25).

Further, Emerson merely discloses the use of FET isolation buffers to isolate a connector containing a memory module for removal (column 8, line 50-, line 45). In fact, Emerson is directed to a parallel bus structure as illustrated in Fig. 1 of Applicant's specification rather than the recited ring bus structure and thus is silent as to providing a short-circuit or an open circuit in the bus structure as recited in the claims.

One of ordinary skill in the art at the time the invention was made would not have been motivated to combine the references as attempted by the Examiner, since the attempted combination does not disclose or suggest all the features of the claim. Accordingly, claim 9 is patentable over the attempted combination of the AAPA, Chow, Thörnblad, Funaba and Emerson.

Claim 10 -- 35 U.S.C. § 103(a)

Claim 10 has been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Lasker, Thörnblad and Funaba, and further in view of Emerson. Applicant traverses this rejection.

Claim 10 incorporates the features of claims 2 and 4 from which it depends, and contains features similar to the features recited in claim 9. Accordingly, for reasons similar to the reasons set forth above in the arguments for claims 2, 4 and 9, claim 10 is patentable over the combination of the AAPA, Lasker, Thörnblad, Funaba and Emerson.

Claim 11 --- 35 U.S.C. § 103(a)

Claim 11 has been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Lasker, Thörnblad and Funaba, and further in view of Emerson. Applicant traverses this rejection.

Claim 11 incorporates the features of claim 5 from which it depends, and contains features similar to the features recited in claim 9. Accordingly, for reasons similar to the reasons set forth above in the arguments for claims 5 and 9, claim 11 is patentable over the combination of the AAPA, Lasker, Thörnblad, Funaba and Emerson.

Claim 12 --- 35 U.S.C. § 103(a)

Claim 12 as been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Chow, Thörnblad and Funaba, and further in view of U.S. Pat. Pub. No. 2002/0083255 to Greeff *et al.* (“Greeff”). Applicant traverses this rejection.

As established above in the arguments for claim 1, from which claim 12 depends, and the arguments for claim 3, the combination of the AAPA, Chow, Thörnblad and Funaba does not disclose or suggest at least a hard disk device to which the data stored in said memory modules is temporarily copied, and a control device which, when an arbitrary memory module is being replaced, switches an operational mode of a ring bus from a unidirectional bus capable of either sending or receiving a signal unidirectionally, to a bi-directional bus capable of sending and receiving a signal bi-directionally, as incorporated into the claims by virtue of their dependence. Greeff does not cure at least these deficiencies.

Greeff is directed to eliminating reflections caused by electrical stubs in a bus system by using a segmented bus wherein the bus segments are connected through switches (Abstract). Greeff, however, fails to disclose or suggest at least the above-noted features deficient in the AAPA-Chow-Thörnblad-Funaba combination.

Further, Greeff does not disclose or suggest wherein said short-circuit device is a connector, which is provided in association with said memory modules, respectively, and is provided with shorting pins which short-circuits bus connection, which is disconnected by removing said memory module, at the time when said memory module is removed, and releases the short-circuit at the time when said memory module is inserted, as recited in the claim.

The Examiner relies on Greeff to allegedly disclose a connector as a short-circuit device for short-circuiting or opening bus connections which are disconnected by removing a memory module. Greeff discloses that a low-cost jumper or other simple continuity module may be used in place of a memory module to maintain the continuity of the bus (paragraph [0069]). However, as recited by claim, an additional module or connector is not required to maintain continuity of the bus.

As recited in the claim, the connector is provided in association with the memory modules and is provided with shorting pins which short-circuit the bus connection *at the time when the memory module is removed*. In other words, the connector normally receives the memory module also provides the short-circuiting bus connection when the memory module is removed. Thus, the recited connector is provided in association with the memory modules rather than independently of the memory modules as disclosed by Greeff. Therefore, no additional

module or connector need be inserted as is required by the disclosure of Greeff. Thus, Greeff does not cure the deficiencies of the AAPA-Chow-Thörnblad-Funaba combination.

In the Response to Arguments section of the Office Action, the Examiner states “the features upon which Applicant relies (i.e., “an additional module or connector is not required to maintain continuity of the bus”) are not recited in the rejected claim(s).” Applicants respectfully disagrees.

Claim 12 recites, “wherein said short-circuit device is *a connector*, which is provided *in association with said memory modules*, respectively, and is *provided with shorting pins which short-circuits bus connection*, which is disconnected by removing said memory module, *at the time when said memory module is removed*, and releases the short-circuit at the time when said memory module is inserted.” (*Emphasis added*).

As recited, claim 12 clearly indicates that the connector short-circuits the bus connection at the time when the memory module is removed. Thus, the claim language makes clear that the connector associated with the memory modules short-circuits the bus with the shorting pins provided in the connector itself. Greeff, on the other hand, short-circuits the bus *after* the memory module is removed and Greeff's jumper is inserted. Since the claim language clearly recites that the connector associated with the memory modules short-circuits the bus at the time when the memory module is removed, a negative limitation preventing the use of an additional module connector is not required, as the Examiner alleges. In addition, the jumper disclosed by Greeff is not a “connector associated with the memory modules” as claimed, since the jumper is used in place of the memory modules.

Accordingly, since the references, alone or in combination, do not disclose or suggest all the claimed features, claim 12 is patentable over the combination of the AAPA, Chow, Thörnblad, Funaba and Greeff.

Claim 13 --- 35 U.S.C. § 103(a)

Claim 13 has been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Lasker, Thörnblad and Funaba, and further in view of Greeff. Applicant traverses this rejection.

Claim 13 incorporates the features of claims 2 and 4 from which it depends, and contains features similar to the features recited in claim 12. Accordingly, for reasons similar to the reasons set forth above in the arguments for claims 2, 4 and 12, claim 13 is patentable over the combination of the AAPA, Lasker, Thörnblad, Funaba and Greeff.

Claim 14 --- 35 U.S.C. § 103(a)

Claim 14 has been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the AAPA in view of Lasker, Thörnblad and Funaba, and further in view of Greeff. Applicant traverses this rejection.

Claim 14 incorporates the features of claim 5 from which it depends, and contains features similar to the features recited in claim 12. Accordingly, for reasons similar to the reasons set forth above in the arguments for claims 5 and 12, claim 14 is patentable over the combination of the AAPA, Lasker, Thörnblad, Funaba and Greeff.

AMENDMENT UNDER 37 C.F.R. § 1.116
U.S. Appln. No.: 10/724,164

Attorney Docket No.: Q78699

New claims

Applicant has added new claims 39-43. New dependent claim 40 depends from new independent claim 39. New dependent claims 42 and 43 depend from new independent claim 41. New claims 39-43 are supported throughout the specification drawings. Applicant respectfully submits that no new matter has been added. Applicant submits that claims 39-43 are patentable over the cited prior art at least since the prior art does not disclose or suggest first and second operational modes as recited in the claims.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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